Exhibit 23-Avoyelles Parish Port-Geotechnical Report

Geotechnical Testing Laboratory, Inc.
Engineering and Construction Materials Testing Services

July 12, 2013

Central Louisiana Economic Development Alliance
P.O. Box 465
Alexandria, Louisiana 71309

Attention: Mr. James H. Clinton
President and C.E.O.

RE: Preliminary Geotechnical Investigation Services
Louisiana Economic Development Certified Sites Program
Port of Avoyelles, Avoyelles Parish, Louisiana
GTL Report No. 06-13-145

Dear Mr. Clinton:

Geotechnical Testing Laboratory, Inc. is pleased to submit this preliminary report of subsurface exploration for the above referenced project. Included in the report are the results of the exploration and general recommendations concerning the potential design and construction of the foundations.

We appreciate the opportunity to have provided you with our geotechnical engineering services and look forward to assisting you by providing additional investigation services for individual projects during the development of the subject tract. If you have any questions concerning this report, or if we may be of further service, please contact our office.

Respectfully submitted,
Geotechnical Testing Laboratory, Inc.

N. J. Gorsha, P.E.
Louisiana Registration # 20082

Ken Gorsha
President

7/12/13

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Preliminary Geotechnical Investigation Services

Louisiana Economic Development Certified Sites Program

Port of Avoyelles, Avoyelles Parish, Louisiana

GTL Report No. 06-13-145

Prepared For:

Central Louisiana Economic Development Alliance

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Preliminary Geotechnical Investigation Services
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Introduction:

This report transmits the findings of a geotechnical investigation performed for the above-referenced project. The purpose of this investigation was to define and evaluate the general subsurface conditions in the general vicinity of a planned new industrial complex. Specifically, the study was planned to determine the following:

- Subsurface stratigraphy within the limits of our exploratory borings.
- Classification, strength, and compressibility characteristics of the foundation strata.
- Suitable foundation systems and allowable soil bearing pressures.

The purpose of this report is to provide the owner, structural engineer, civil engineer, and other design team professionals with preliminary recommendations to consider for the design and construction of the proposed project. This report should not be used by the contractor in lieu of project plans and specifications.

Project Authorization:

Formal authorization to perform the work was provided by Mr. James H. Clinton, President and C.E.O. of the Central Louisiana Economic Development Alliance (client), by accepting our May 31, 2013 written proposal. Authorization to proceed was provided on the same date. Field procedures were conducted between June 13 and July 3, 2013. To accomplish the intended purposes, a three-phase study program was conducted which included:

- a field investigation consisting of five exploratory test borings with samples obtained at selected intervals;
- a lab testing program designed to evaluate the expansive and strength characteristics of the subsurface soils; and,
- an engineering analysis of the field and laboratory test data for preliminary foundation design recommendations.

No additional analysis was requested. A brief description of the field and laboratory test procedures are provided in the Appendix.

Project Description:

The project will be the development of an industrial park site. We understand that the industrial park may consist of a number of structures varying from one (1) story to four (4) stories in height. Preliminary structural information was not available at the time this report was prepared. The proposed buildings should consist of either steel or wood framing and could be supported on either shallow foundations, or on drilled shafts bearing at depths sufficient to resist the anticipated loadings. The pavements will most likely consist of light duty pavements for passenger cars and pickup trucks and heavy duty pavements for tractor-trailer trucks.

For the purpose of this report, we have assumed that column loads could be between 25 and 150 kips, and that maximum continuous wall loads will be between one (1) and four (4) kips per linear foot. Maximum uniform and isolated concentrated floor loads are expected to be 125 psf and five (5) kips, respectively. Grade changes are expected to be nominal with no more than two (2) to three (3) feet of cut or fill.

Information pertaining to anticipated traffic loads and volumes was not available. For the purpose of our pavement analysis of this report, we assume that the industrial traffic could consist of up to 500 repetitions of light passenger cars and pick-up trucks, 50 medium-sized delivery trucks and vans, and up to 50 heavy tractor-trailer trucks per day.

If any of this information should change significantly or be in error, it should be brought to our attention so that we may review recommendations made in this report.

Site and Subsurface Conditions:

The project site is a 270± acre tract of land located on the west frontage of State Highway 105 in Simmesport, Avoyelles Parish, Louisiana. The site was noted to slope downward to the west with visually estimated elevation differences of between approximately five (5) and six (6) feet. The site was cultivated with soy beans at the time of drilling. The drilling rig experienced moderate difficulty moving about the site.

Subsurface Stratigraphy:

In accordance with your request, general subsurface conditions across the site were explored by drilling a total of five (5) borings to depths between approximately 50 and 100 feet. The borings were located in the field by the drilling crew by measuring approximate distances from existing features as shown on the Plan of Borings included in the Appendix of this report.

The stratification of the soils encountered during field drilling operations is presented on the boring logs in the Appendix. The stratification of the subsurface materials shown on the boring logs represents the subsurface conditions encountered at the actual boring locations and variations may occur across the site. The lines of demarcation represent the approximate boundary between the soil types, but the actual transition may be gradual. The following subsurface descriptions are of a generalized nature to highlight the major stratification features. The boring logs should be reviewed for more detailed information.

In order of increasing depth, the borings generally encountered the following soil strata beneath the surface: lean clay (CL), lean to fat clay (CL-CH), fat clay (CH), sandy silt (ML), silty sand to sandy silt (SM-SL), and silty sand (SM).

Groundwater Conditions:

Seepage was observed at depths of 17 to 30 feet during advancement of the test borings. Groundwater was measured at depths of 10 to 28 feet below existing ground surface upon completion of the borings, and Boring B-1 had a hydrostatic water level at 13.5 feet after 48 hours. The subsurface water regime is subject to change with variations in climatic conditions. Future construction activities may also alter the surface and/or subsurface drainage patterns of this site. Therefore, groundwater conditions should be explored at the start of construction by others. If there is a noticeable variance from the observations reported herein, then GTL should be notified immediately to review the effect, if any, such data may have on the design recommendations. It is not possible to predict future ground water conditions based upon short-term observations.

Foundation Recommendations:

The soil parameters presented below are based on single borings placed at irregular intervals across the site. The deviations between the boring locations indicate variable subsurface conditions across the site and should not be assumed as representative of the individual borings. Thus, the findings presented herein should be considered preliminary in nature and should be confirmed through further investigation prior to development of the subject parcel.

Prior to developing any section of the tract, a specific subsurface investigation should be obtained and tailored to the individual project. This report should not be used in lieu of a final geotechnical investigation addressing site specific needs for the intended projects.

Detailed information on structural systems and planned grading was not available to us at the time this report was prepared. Based on the size and type of anticipated structures, as well as the findings from this investigation, a system of shallow footings with an on-grade floor slab, in conjunction with the recommended subgrade preparation is believed to be the most practical and economical means of support. However, heavier building loads could result in the use of deep foundations. Recommendations for both foundation types are discusses separately below.

Potential Vertical Rise (PVR) values were estimated to vary between less than one (1) inch to approximately 3.75 inches for this site. One (1) inch of PVR is generally accepted as the maximum allowable value for design and construction in the geographical area. The surficial soils encountered by the borings are considered to be moderately to highly expansive. The areas with highly expansive fat clay at or near the surface should require additional preparation prior to placing the foundation(s).

Shallow Foundations:

To remediate variable soil conditions in the surficial zone, provide a consistent subgrade for slab support, and reduce the potential for active soils to affect the foundations where active clays are present at the surface, GTL recommends that a uniform layer of density-approved select fill be provided beneath the floor slabs. The select fill for the building pads should extend at least five (5) feet beyond the perimeter of the buildings. The table below indicates the estimated undercut and select fill pad thickness to limit the PVR to a value of one (1) inch or less for the individual building pads in the vicinity of the boring locations.

Boring No.	Estimated PVR (inches)	Estimated Thickness of Select Fill Pad (feet)
1	< 1.00”	1.0
2	1.75”	2.5
3	2.75”	5.0
4	3.75”	6.0
5	1.00”	1.0

The fill should be used to elevate the building pads so that positive drainage is provided away from the buildings. Where feasible, elevating the building pads with fill is generally desirable because this aids in providing positive drainage away from the floor slabs and foundations and helps prevent water from collecting in the filled areas.

Excessive movement should not occur if careful measures are taken to minimize moisture variations beneath the structure to preclude loss of shear strength of foundation soils. In areas where the surficial soils are primarily fat clay, it is not uncommon to assume differential movement as half of the PVR. However, it should be noted that for extreme conditions (i.e. soils dry and shrink in one area with soils in another area being exposed to water and swelling) differential movement can be equal to or even double the PVR.

The plans should include a section illustrating the placement and compaction of at least 12 inches of fat clay below all landscaped areas and areas exposed to direct rainfall or runoff. The fat clay should act as a horizontal moisture barrier to inhibit moisture from infiltrating and saturating the select fill pad and thereby increasing the potential for swelling of the underlying fat clays. The fat clay layer should be placed and compacted to within six (6) inches of finished grade to allow the placement of a topsoil layer. The fat clay layer should extend at least five (5) feet beyond the perimeter of the structure.

Shallow foundations may utilize individual or continuous footings bearing within the upper five (5) feet of the surficial zone. The provision of one (1) to six (6) feet of select fill should be anticipated to be necessary to provide a suitable subgrade for the structures. Typical bearing capacity values for shallow spread footings may vary from between approximately 2,000 psf to 2,500 psf for soils with consistencies of medium dense or medium stiff. Strip footings for continuous wall loads may be estimated between 1,500 and 2,000 pounds per linear foot.

The above allowable soil bearing values should result in a total settlement of one (1) inch, with approximately ½ inch occurring differentially (between adjacent individual footings or within 10 feet of a continuous footing). Approximately half of this settlement should occur during construction. The remaining long-term settlement of ½ inch (1/4 inch occurring differentially) should be tolerable. These settlement estimates are valid for footings up to five (5) feet in plan dimensions. If footings larger than five (5) feet are required, this office should be contacted to issue additional recommendations to mitigate the potential for higher settlement.

Construction of select fill as specified herein beneath the building should result in the development of a modulus of subgrade reaction (k_s) to range between 125 and 150 pounds per cubic inch based upon empirical equations that estimate the results of a plate load test. For warehouse slabs exposed to fork lift loads, the subgrade modulus may be increased to between 250 and 350 pci by placing eight (8) inches of crushed limestone base or equal below the slab.

Deep Foundations:

We understand that deep foundations may be considered for use at this site due to special equipment or building loads. Shafts should be founded at a minimum estimated depth of 30 feet and should not extend below a depth of 50 feet below the existing ground surface. The table below presents the estimated allowable single shaft capacities for an 18 inch diameter shaft founded at depths between 30 and 50 feet below present ground surface. Once the final site investigations are performed, the estimated values for other diameters of deep foundations may be provided at that time.

Diameter of Shaft (inches)	Depth of Shaft (feet)	Allowable Single Shaft Capacity (kips)	
		Compressive	Uplift
18	30	15	10
	35	20	15
	40	25	20
	45	30	25
	50	35	30

The factor of safety for these calculations is estimated to be 2.0. Shafts should have a minimum diameter of 18 inches even if the actual bearing pressure is less than the design value. Groundwater will most likely be encountered in the drilled shafts. Casing for installing drilled shafts is always a possible necessity when dealing with the unknowns inherent with subsurface conditions. It is prudent for contract documents to include this option.

Drilled Shaft Considerations:

Due to the presence of a shallow groundwater table with a hydrostatic head, consideration should be given to installing the drilled shafts using a slurry method which maintains a constant slurry level equal to or slightly above the hydrostatic water level. If the shafts can be sealed from water intrusion using casing, the slurry option may be eliminated.

It is recommended that the design and construction of drilled piers should generally follow methods outlined in the manual titled Drilled Shafts: Construction Procedures and Design Methods (Publication No: FHWA-IF-99-025, August 1999).

We emphasize that close engineering supervision is essential during installation of the drilled pier foundations in order to assure that construction is performed in accordance with the plans and specifications. Also, to insure proper construction of the drilled piers at this site, close coordination between the drilling and concreting operations is considered to be of great importance. Detailed inspection of drilled shaft construction should be made to verify that the shafts are vertical and founded in the proper bearing stratum and to verify that all loose materials have been removed prior to concrete placement.

Driven Piles:

The bearing capacity of the naturally occurring soil was evaluated from the results of the Standard Penetration Tests (SPT) and the Unified Soil Classifications. These test results indicate that the existing soil has a range from low to moderate bearing capacity with respect to shear strength. The superstructure loads for the commercial structures may be supported on Class B creosote treated timber piles founded at a minimum depth of 25 feet below the existing ground surface. The final depth of the piles may be selected from the following table after considering the estimated total structural loads.

Depth (feet)	Allowable Compressive Load (kips)
25	15
30	25
35	30
40	40
45	55
50	65

If the above allowable timber pile loads are found to be inadequate for the actual structural loads, consideration may be given to using 12-inch square per-cast, pre-stressed concrete piles. Such piles may be selected from the following table.

Depth (feet)	Allowable Compressive Load (kips)
25	30
30	40
35	50
40	60
45	70
50	80

The factor of safety for these calculations is at least 2.0. Total settlement is estimated to be on the order of one (1) inch or less for foundation units designed in accordance with recommendations provided herein. Differential settlements (between adjacent piles or clusters) are estimated to be on the order of 0.5 inch or less.

The recommended pile capacities are based on field and laboratory tests and/or empirical data. The magnitude of this project should include a pile testing program to determine if the pile capacities are adequate, or if shorter piles are warranted.

Driven Pile Considerations:

It is recommended that the installation of driven piles should generally follow methods outlined in Section 804 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition. LaDOTD specifications may vary and clarifications may be necessary where this information conflicts with LaDOTD requirements.

Detailed inspection of driven pile construction should be made to verify that the piles are driven vertically and founded in the proper bearing stratum. The installation of all piling should be monitored by personnel familiar with the construction techniques required to install pre-cast, pre-stressed concrete piles.

Pre-drilling for the piles may be necessary to stabilize the driven piles to prevent lateral drifting of the piles prior to achieving their final depth. Pilot holes may extend to a depth no deeper than 10 feet. The piling should be driven below the depth of the pilot hole to depths shown on the final plans, but not less than the required bearing resistance shown on the plans. In any case, wood piling should not be driven beyond the point where the blow count exceeds 30 blows per foot. If damage to the pile is apparent, driving should cease.

All pile driving should be performed with power hammers. Approval of the contractor's pile driving equipment should be based on the wave equation analysis computer program FHWA-WEAP87 or newer version. A wave equation analysis should be performed for each pile type and size required in the plans. Approval of the pile driving system does not relinquish the contractor's responsibility from driving the piles to the required pile tip elevation without damage. The criteria the engineer should use to evaluate the pile driving equipment from the wave equation should be the pile driving resistance. The required number of hammer blows at the required end-of-driving pile capacity should be from 36 to 146 blows per foot. The pile driving resistance at any depth above the required pile tip elevation should be achieved with a reasonable driving resistance of less than 30 blows per foot for timber piles or 300 blows per foot for concrete piles. All piles, including test pile, should be driven with the same hammer.

If the piles are to be driven in clusters, they should be driven at a minimum center-to-center spacing of three (3) times the pile diameter. Piles driven at spacings greater than this should be designed to act as single piles.

Seismicity:

According to the USGS website for Seismic Hazard Design Parameters, the project site has a mapped 0.2 second spectral response acceleration (S_s) of 0.130 g. The project also has a mapped 1.0 second spectral response acceleration (S_1) of 0.062. Based on Section 1615.1.1 of the IBC2003, a Site Class of E has been estimated for this site. Using Tables 1615.1.2(1) and 1615.1.2(2), the mapped spectral accelerations, and Site Class E; the site coefficients F_a and F_v have been determined to be 2.5 and 3.5, respectively. The design spectral response accelerations, S_{DS} and S_{D1}, were determined to be 0.217 g and 0.145 g, respectively.

OSHA Classification for Excavations:

For excavations deeper than four feet, the side slopes should conform to applicable federal, state and local regulations. The guidelines provided in the construction requirement section should be followed. A review of the boring logs and testing for the site indicates that the soils should be classified as a Type B Soil contingent on monitoring of the excavation to confirm the absence of free water seeping during the time the excavation is open. For this type of excavation, a slope of 1H:1V is allowed if the excavation is 20 feet or less in depth. Federal rules require daily inspection of excavations by a competent person when workers are present.

Underground Storage Tanks

The manufacturer's recommendations should be strictly followed for tank shipment, delivery, unloading and installation of tanks and piping, and in anchoring them against potential uplift forces. As a minimum, the installation should comply with published guidelines of the American Petroleum Institute (API) and the manufacturer's instructions.

We suggest that construction equipment and stockpiled materials should be kept away from the excavation at a minimum distance equal to the excavation depth to avoid surcharging of the excavation slopes. Also, the sequence of construction should be planned so that soil support under and beside foundation elements is not jeopardized by any tank excavations.

It is critical that consideration be given to the risk of floating the tank, both during installation and the service life. Such consequences include damage to the tank system and paving, loss of product and, if a product release occurs, related environmental impacts, including surface cleanup and remediation to soil and groundwater. The tank manufacturer should be contacted regarding proper anchoring, tank-hold fill specifications, and allowable fill and loads over the tanks. Control of runoff into the excavation during backfilling and paving over the tanks is also critically important to preventing flotation.

For flotation calculations, we recommend that the unit weight of the soil above the tank be assumed to be a maximum of 100 pounds per cubic foot. Groundwater was present in the borings, and it is anticipated that water may seep into open excavations during the construction at some locations. The excavations should be clean and free of loose soil or standing water. The tanks may continue to be susceptible to flotation even after the tank-hold is backfilled with granular materials, until it is ballasted internally by filling, and/or by external tie-down anchors.

Pavements:

In the absence of known traffic volumes, we assume that some areas of the plant will be paved for light vehicular traffic and other areas will receive heavier tractor-trailer loads. We assume that the pavements receiving light traffic could receive asphaltic concrete or Portland cement concrete surfacing. Heavier tractor-trailer traffic could use drives and parking areas surfaced with either crushed stone, asphaltic concrete or Portland cement concrete.

Information for this pavement analysis is inferred from the building borings. Our scope of services did not include extensive sampling and CBR testing of existing subgrade or potential sources of imported base material for the specific purpose of a detailed pavement analysis. Instead, we have assumed pavement related design parameters that are considered to be typical for the area soil types. It has been assumed that the constructed pavement subgrade will consist of well compacted soils. Based on experience, it is anticipated that the compacted native subgrade will yield a California Bearing Ratio (CBR) of between 2.0 and 5.0.

The general pavement design information presented in this report is based on subsurface conditions inferred by the test borings, information published by The Asphalt Institute, the Portland Cement Association, and past experience in the locale. The published information was utilized in conjunction with the available field and laboratory test data to develop general pavement designs based on the AASHTO structural numbering system.

Pavements to be utilized by light vehicular traffic may be either flexible or rigid pavement sections supported on well-compacted subgrade or select fill. However, Portland cement concrete pavements should be utilized where large loads (i.e. waste disposal containers, etc.) are located. Both flexible and rigid pavement sections have been designed using general engineering design criteria referenced above.

Subgrade:

It is paramount to the satisfactory performance of pavements that the subgrade be stable under loads and compacted prior to deployment of flexible base or concrete. All pavement subgrade should be proof rolled prior to beginning placement of pavement section materials. Stable subgrade is especially critical to the successful performance of flexible pavement sections. The surficial soils within the proposed paving limits should be tested to determine the average plasticity index (PI) value. If the average PI of the subgrade is above a value of 20, the upper eight (8) inches of subgrade should be either removed and replaced with select fill, or treated with lime to reduce the PI to an acceptable limit.

If fill is imported to complete the pavement grading, the material may consist of usable soils as determined by Section 203 of the *Louisiana Standard Specifications for Roads and Bridges, 2006 Edition.* If the fill has 50 percent or more silt, the material should have a maximum liquid limit of 45 with a plasticity index between 11 and 25. For fill with a silt content less than 50 percent, the plasticity index should be between 0 and 25.

The subgrade should be compacted within the range of one (1) percentage point below to three (3) percentage points above the optimum moisture content value and a minimum of 95% of the maximum density as determined by the Standard Proctor (ASTM D-698) test. As a guideline, it is recommended that field density tests be taken at a frequency of not less than one (1) test per 5,000 square feet of surface area per lift or a minimum of four per lift for each tested area for the pavement.

Subgrade may be, or become, wet and unstable under paving areas, depending on several factors, including construction season, groundwater fluctuations, contractor's maintenance of positive drainage, routing of equipment, weather, and scheduling constraints. Flexible base and concrete should be placed only on subgrade that has passed both stability and compaction requirements. Also, it is prudent for contract documents to accommodate over-excavation and replacement as needed or, more typically, to anticipate such remedial activity through the change order process. In any event, the owner should be advised that this risk is inherent in practically every construction project that involves site work.

Lime Treatment:

A review of the boring logs indicates that the subgrade below some areas of the pavements could consist of highly plastic clays. Normally, these materials are considered to have poor support characteristics for pavements unless they are chemically treated to improve their engineering properties. Generally, soils with a PI value greater than 20 should be either removed to a depth of eight (8) inches and replaced with density approved select fill, or lime-treated as discussed below.

Clayey soils with excessive plasticity are subject to loss in support value with increases in moisture, as well as volumetric changes (shrinking and swelling) accompanying moisture changes. They chemically react with hydrated lime, becoming more stable. Clayey soils should be free of organics and other deleterious materials. Lime treatment should be performed in accordance with the applicable provisions of Section 304 of the *Louisiana Standard Specifications for Roads and Bridges,* 2006 Edition.

A bulk sample of the surficial clays was submitted to the laboratory for testing. Based on the results of our laboratory tests, it appears that the fat clay subgrade should be treated with a minimum of four (4) percent by dry weight of hydrated lime. Assuming an average dry unit soil weight of 92 pounds per cubic foot, the estimated weight of lime for field purposes should be 2.76 pounds per square yard per inch of compacted thickness. A copy of the Using pH to Estimate the Soil-Lime Proportion Requirement for Soil Stabilization is included in the Appendix of this report.

The lime-treated clay should be compacted at a moisture content not less than optimum, nor more than four (4) percent above the optimum as defined by ASTM D 698 (Standard Proctor). Compaction should be at least 95 percent of the maximum dry density defined by this standard. The required moisture content and density of the compacted material should be maintained until construction is complete.

Cement Treatment:

A bulk sample of the lean clay subgrade was submitted to the laboratory to determine its suitability for use for cement treatment. The results of those tests indicate that the subgrade soils at this site are not suitable for use in cement treatment. A copy of the Determination of Usable Materials for Cement Treatment is included in the Appendix of this report.

Crushed Stone Surfacing:

Some heavy truck areas may consist of crushed stone surfacing. The estimated material thicknesses presented herein assume that the upper eight (8) inches consist of density-approved subgrade and that the drives will receive no more than 20 heavy tractor-trailer trucks with H-20 loading per day.

The subgrade should be crowned along the centerline to shed surface water off to the sides of the roadway where drainage ditches or swales collect the runoff and drain it away as rapidly as possible. At a minimum, the drainage for the roadbed should consist of shallow gravity ditches cut on both sides of the roadway. The bottom of the ditch should be a minimum of 18 inches below finished pavement elevation and the side slopes should be cut at a maximum 3H:1V. The slopes for the ditch bottoms should be checked to ensure rapid drainage of runoff away from the sides of the roadbed. Water must not be allowed to pond or stand in the ditches near the perimeter of the roadways.

The crushed stone materials should have a minimum compacted thickness of 12 inches and should meet the requirements for Item 1003.04(a) of the Louisiana DOTD Standard Specifications for Construction of Roads & Bridges, Current Edition. As an option, Recycled Portland Cement Concrete meeting the requirements for Item 1003.04(c) may be used. The stone surface should be compacted to 95 percent of the maximum density defined by the Modified Proctor (ASTM D-1557). Periodic re-shaping of the gravel surface should be anticipated. Potholes and ruts could develop within several years, depending upon the drainage of the driveway and the frequency of truck loadings. We recommend that a stockpile of the crushed stone surfacing be provided on-site for periodic maintenance of the truck drives.

If the access drive will be paved with an asphaltic concrete wearing surface at some future time, the granular base should be compacted and shaped to produce a uniform thickness of material of eight (8) inches. Asphaltic concrete material should consist of Item 501, Type 3. The wearing course should have a minimum compacted thickness of two (2) inches and should be compacted to a minimum of 95 percent of the density of the laboratory molded specimen, or a minimum of 92% of the maximum theoretical density.

Portland cement concrete should be provided at trash receptacles and approach pads and concrete thickness should be a minimum of seven (7) inches. Concrete compressive strength should be a minimum of 3,000 psi at 28 days. The concrete should be designed with 5 percent (± 1 percent) entrained air to improve workability and durability.

If the access drive will be paved at the time of construction, the thickness of the base may be reduced to seven (7) inches, provided the subgrade is prepared as discussed above. All paving recommendations are based on stable subgrade. Subgrade areas which are unstable should be over-excavated and replaced, or otherwise rendered stable prior to proceeding with base material placement.

Traffic and Design Data:

Commercial pavement sections presented herein are based upon minimum material thickness as recommended by the Asphalt Institute and the Portland Cement Association. These sections are not based upon anticipated traffic loads as these were not available at the time this report was prepared. As previously discussed, we assume that the industrial traffic could consist of up to 500 repetitions of light passenger cars and pick-up trucks, 50 medium-sized delivery trucks and vans, and up to 50 heavy tractor-trailer trucks per day.

Asphaltic Pavement Materials:

Surface or wearing course asphaltic concrete should consist of Item 501, Type 3. Surface course asphalt should be compacted to a minimum of 95 percent of the density of the laboratory molded specimen, or a minimum of 92% of the maximum theoretical density. The placement temperature and compacted thickness of Hot Mix Asphaltic Concrete (HMAC) should be determined during placement. Samples for extraction and gradation analysis should be obtained at the rate of at least one sample for each day’s operation, for each pavement course, with at least one sample for each 600 tons.

Granular base should be compacted to 95 percent of the maximum density defined by the Modified Proctor (ASTM D-1557). Cohesive (clay) subgrade soils should be compacted to a minimum of 95% of maximum density defined by the Standard Proctor (ASTM D-698). Non-cohesive (sand) subgrade soils should be compacted to 100% of maximum density defined by the Standard Proctor (ASTM D-698).

Portland Cement Concrete:

Concrete compressive strength should be a minimum of 3,000 psi at 28 days. The concrete should be designed with 5 percent (± 1 percent) entrained air to improve workability and durability. Subgrade (and subbase, if specified) should be compacted to a minimum of 95% of the maximum density defined by the Standard Proctor (ASTM D-698). The design of steel reinforcement, if advised by the structural engineer, should be in accordance with local or accepted codes. (Although reinforcement is not normally required by design, it is customary to provide minimum reinforcement of 6 x 6 x No. 6 welded wire flat mesh or No. 3 deformed steel bars spaced on 18-inch centers each way.)

Recommended Pavement Sections:

The table below presents a summary of both rigid and flexible pavement sections for standard and heavy duty applications. It should be noted that the pavement sections as presented below are minimums. If it is desired to reduce potential cracking, greater thickness of select fill and/or greater pavement section thickness could be utilized. In addition, long term pavement performance requires good drainage and performance of periodic maintenance activities. Refer to the text for qualification of the designs and further discussion and limitations.

MINIMUM PAVEMENT RECOMMENDATIONS *		
Pavement Type	**Light Duty (Parking Lot Entries & Drives)**	**Heavy Duty (Truck Entries & Drives)**
Portland Cement Concrete	5.0" Portland Cement Concrete 4.0" Item 1003.03 (b) Base 8.0" Density-Approved Subgrade or Imported Useable Fill	5.0" Portland Cement Concrete 4.0" Item 1003.03 (b) Base 8.0" Density-Approved Subgrade or Imported Useable Fill
Asphalt Over Crushed Stone Base	3.0" Item 501 Type 3 Surface 7.0" Item 1003.03 (b) Base 8.0" Density-Approved Subgrade or Imported Useable Fill	3.0" Item 501 Type 3 Surface 14.0" Item 1003.03 (b) Base 8.0" Density-Approved Subgrade or Imported Useable Fill
*Materials shall meet general requirements of the Louisiana DOTD Standard Specifications for Construction of Roads & Bridges, and specific requirements listed herein.		

The pavement section for the parking stalls may consist of either five (5) inches of Portland cement concrete, or two (2) inches of HMAC over six (6) inches of compacted stone base. Concrete thickness at trash receptacles should be a minimum of seven (7) inches. All paving recommendations are based on stable subgrade. Subgrade areas which are unstable should be over-excavated and replaced, or otherwise rendered stable prior to proceeding with base material placement.

Geotechnical Risk:

The concept of risk is an important aspect of the geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. The analytical tools which geotechnical engineers use are generally empirical and must be used in conjunction with engineering judgment and experience. Therefore, the solutions and recommendations presented in the geotechnical evaluation should not be considered risk-free and, more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The engineering recommendations presented in the preceding sections constitutes GTL's professional estimate of those measures that are necessary for the proposed structure to perform according to the proposed design based on the information generated and referenced during this evaluation, and GTL’s experience in working with these conditions.

Limitations:

The exploration and analysis of the site conditions reported herein are considered preliminary in detail and scope and are not intended to form a basis for pavement and foundation design. The information submitted is based on the available soil information only and not on design details for the intended projects.

The findings, recommendations or professional advice contained herein have been made after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology. No other warranties are implied or expressed.

The scope of services did not include any environmental assessment for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site. Any statements in this report or on the boring logs regarding odors, colors, or unusual or suspicious items or conditions are strictly for the information of the client. Prior to purchase or development of this site, an environmental assessment is advisable.

The scope of services did not include a geologic investigation to address any faults, large scale subsidence, or other macro geologic features not specifically addressed in this report or the agreement between GTL and the client.

After plans are more complete, it is recommended that the soils and foundation engineer be retained to provided a subsurface investigation tailored to meet the specific needs of the project.

This report has been prepared for the exclusive use of our client for the general application for the referenced project. GTL cannot be responsible for interpretations, opinions, or recommendations made by others based on the data contained in this report.

This report was prepared for general purposes only and should not be considered sufficient for purposes of preparing accurate plans for construction. Contractors reviewing this report are advised that the discussions and recommendations contained herein were provided exclusively to and for use by the project owner.

END OF REPORT TEXT

SEE FOLLOWING APPENDIX w/BORING LOGS & TEST RESULTS

APPENDIX

FIELD AND LABORATORY PROCEDURES
PLAN OF BORINGS
LOG OF BORINGS
CEMENT TREATMENT RESULTS
SOIL-LIME PROPORTIONING

Field And Laboratory Procedures
For
Louisiana Economic Development Certified Sites Program
Port of Avoyelles, Avoyelles Parish, Louisiana
GTL Report Number 06-13-145

I. <u>Field Operations</u>:

Subsurface conditions were evaluated by advancing five (5) intermittent sample borings drilled between June 13, 2013 and July 3, 2013 within the project area. Boring locations were selected and staked in the field by representatives of Geotechnical Testing Laboratory, Inc. An illustration of the approximate boring locations with respect to the areas investigated is provided on the attached Plan of Borings. Descriptive terms and symbols used on the logs are in accordance with the Unified Soil Classification System (USCS). Surface elevations at the boreholes were not supplied prior to our field studies.

A truck-mounted rotary drill rig was used to make the test borings. Each boring was rotary washed using flight auger drilling techniques. Intermittent undisturbed samples were obtained in the following manner.

Standard penetration tests were performed in accordance with ASTM D-1586 procedures. This test is conducted by recording the number of blows required for a 140-pound hammer falling 30 inches to drive a split-spoon sampler eighteen inches into the substrata. Depths at which split-spoon samples were taken are indicated by two crossed lines in the "Samples" column on the Log of Boring. The number of blows required to drive the sampler for each 6-inch increment were recorded. The penetration resistance is the number of blows required to drive the split-spoon sampler the final 12-inches of penetration. Information related to the penetration resistance is presented under the "Field Data" heading of the Log of Boring as the Standard Penetration (Blows/Foot). These samples were visually examined, logged, and packaged for transport to our laboratory.

Cohesive strata were sampled in accordance with ASTM D-1587 procedures by means of pushing a thin walled Shelby tube a distance of two feet into the substrata. Consistency of the sample was measured in the field by means of a calibrated hand penetrometer. Such values, in tons per square foot, are provided under the "Field Data" heading on the Log of Boring. Depths which these undisturbed samples were obtained are indicated by a shaded portion in the "Samples" column of the Log of Boring. All samples were prudently extruded in the field were sealed to maintain "in-situ" conditions, labeled, and packaged for transport to our laboratory.

The presence of ground water was monitored during drilling operations. Initial water seepage readings are provided under "Stratum Description" at the bottom of the Log of Boring. After boring completion, water levels were allowed to rise and stabilize for several minutes prior to final water readings. These readings are found at the bottom of the Log of Boring under "Water Observations, Feet." Soil sloughing from the walls of the boring are also recorded here as depth of cave-in.

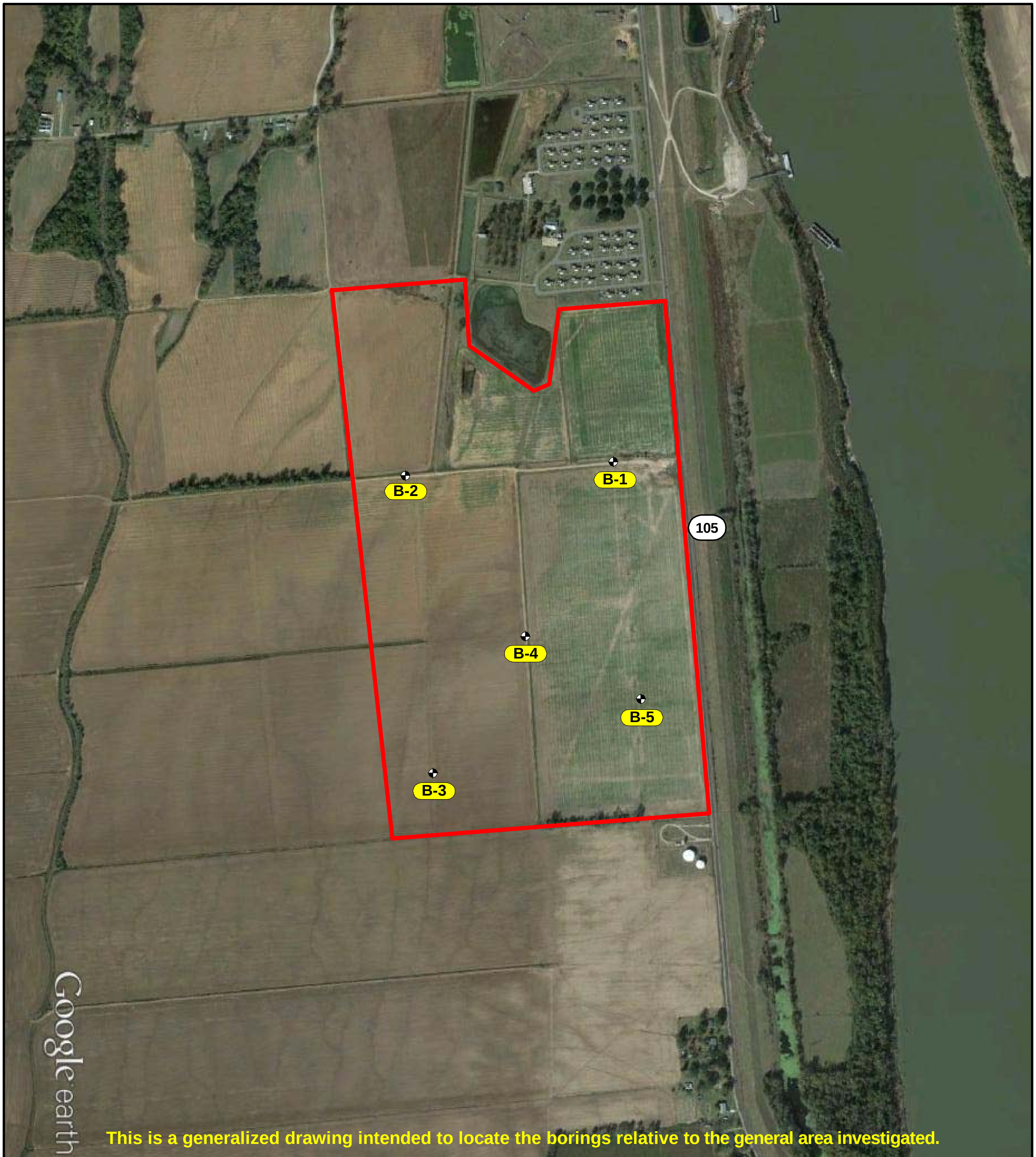
II. Laboratory Studies:

Upon return to the laboratory, all samples were visually examined and representative samples were selected for testing. Tests were performed on selected samples recovered from the test borings to verify classification and to determine pertinent engineering properties of the substrata. Individual tests and ASTM designations are as follows:

Test	**Test Designations**
Atterberg Limits	ASTM D4318
Moisture Content	ASTM D2216
Partial Gradation	ASTM D1140
Unconfined Compression Tests	ASTM D2166
Hydrometer Analysis	ASTM D422
Soil-Lime Proportioning	ASTM D4318

Results for soil classifications are tabulated on the Log of Boring in their respective columns under "Laboratory Data."

Samples obtained during our field studies and not consumed by laboratory testing procedures will be retained free of charge for a period of 30 days. Arrangements for storage beyond that period of time must be made in writing to ***Geotechnical Testing Laboratory, Inc.***



Plan of Borings

(Not to Scale)

PROJECT		
Louisiana Economic Development Certified Sites Program, Port of Avoyelles, Avoyelles Parish, LA		
DATE 7/8/2013	FILE NUMBER 06-13-145	***Central Louisiana Economic Development Alliance***

N

LOG OF BORING B-1

Geotechnical Testing Laboratory, Inc.
226 Parkwood Drive
Alexandria, LA 71301
Telephone: (318) 443-7429

CLIENT: **Central Louisiana Economic Development Alliance**
PROJECT: **Louisiana Economic Development Certified Sites Program**
LOCATION: **Port of Avoyelles, Avoyelles Parish, Louisiana**
FILE No.: **06-13-145**
DATE DRILLED: **6/19/13**
DRILLING METHOD(S): **Diedrich D-50, Rotary Wash**
LOGGED BY: **T. Robin** CHECKED BY: **H. Carroll**

GROUNDWATER INFORMATION:
Water Seepage Noted @ 27.0 Feet While Drilling
Water Level @ 13.5 Feet After 48 Hours
Boring Walls Collapsed @ 14.5 Feet

SURFACE ELEVATION: **Not Determined**

Depth (ft)	N: Blows/ft, P: Tons/sq ft	Moisture Content (%)	Liquid Limit LL	Plastic Limit PL	Plasticity Index PI	Minus No. 200 Sieve (%)	Dry Density (Lbs./Cu.Ft.)	Compressive Strength (Lb./Sq. Ft.)	Description of Stratum
0–3.5	N = 7	18	31	21	10	97		**	Frim Brown LEAN CLAY (CL) w/silt
	P = 0.75	23					96	1250	- red @ 2.5' (to 3.5')
3.5–13.0	N = 7	28							Firm Red LEAN to FAT CLAY (CL-CH)
	P = 1.75	25	49	24	25	99	99	3520	- stiff, brownish red @ 6.0'
	P = 2.00	35					86	1713	- firm, brownish red @ 9.0' (to 13.0')
13.0–27.0	P = 1.00	32	57	24	33	99	92	1852	Firm Gray & Reddish Yellow FAT CLAY (CH)
	P = 1.50	43					78	1389	
	P = 1.25	41					81	1389	(to 27.0')
27.0–38.0	P = 0.50	32	43	22	21	97	96	1215	Firm Gray & Reddish Yellow LEAN CLAY (CL) w/silt
	N = 7	34							(to 38.0')
38.0–50.0	N = 19	36							Medium Dense Gray Silty SAND to Sandy SILT (SM/ML)s
	N = 19	28	NP	NP	NP	46			
	N = 24	33							(to 50.0')

Boring Terminated @ 50.0 Feet

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE

NOTES:
See Plan of Borings for Location
Stratification and Groundwater Depths Are Not Exact

LOG OF BORING B-2

Geotechnical Testing Laboratory, Inc.
226 Parkwood Drive
Alexandria, LA 71301
Telephone: (318) 443-7429

CLIENT: **Central Louisiana Economic Development Alliance**
PROJECT: **Louisiana Economic Development Certified Sites Program**
LOCATION: **Port of Avoyelles, Avoyelles Parish, Louisiana**
FILE No.: **06-13-145**
DATE DRILLED: **6/22/13**
DRILLING METHOD(S): **Diedrich D-50, Rotary Wash**
LOGGED BY: **T. Robin** CHECKED BY: **H. Carroll**

GROUNDWATER INFORMATION:
Water Seepage Noted @ 17.0 Feet While Drilling
Water Level @ 10.0 Feet After 1 Hour
Boring Walls Remained Uncaved

SURFACE ELEVATION: **Not Determined**

DEPTH (FT)	N: BLOWS/FT P: TONS/SQ FT	MOISTURE CONTENT (%)	LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	MINUS NO. 200 SIEVE (%)	DRY DENSITY (Lbs./Cu.Ft.)	COMPRESSIVE STRENGTH (Lb./Sq. Ft.)	DESCRIPTION OF STRATUM
0–5.5	N = 9	19	46	23	23	98			Stiff Brownish Red LEAN to FAT CLAY (CL-CH)
	P = 3.0	26					95	2547	
	P = 3.0	29					92	2501	5.5'
5.5–21.5	P = 2.25	35	75	28	47	99	87	2177	Stiff Brownish Red FAT CLAY (CH)
	P = 1.75	37					83	2130	- brownish red & gray below 8.5'
10	P = 1.25	36					86	1389	
	P = 1.75	40	95	32	63	99	82	1111	- firm @ 14.0'
	P = 1.25	51					74	278	- very soft @ 19.0' 21.5'
21.5–27.0	N = 7	34	32	21	11	95			Firm Reddish Brown & Gray LEAN CLAY (CL) w/silt 27.0'
27.0–50.0	N = 2	33							Very Loose Reddish Brown & Gray Sandy SILT s(ML) w/occasional lean clay (CL) layers
	N = 2	35	NP	NP	NP	57			
	N = 5	32							- loose below 39.0'
	N = 8	31	33	22	11	88			- (split sample)
50	N = 5	29							50.0'

Boring Terminated @ 50.0 Feet

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE

NOTES:
SeeSee Plan of Borings for Location
Stratification and Groundwater Depths Are Not Exact

LOG OF BORING B-3

Geotechnical Testing Laboratory, Inc.
226 Parkwood Drive
Alexandria, LA 71301
Telephone: (318) 443-7429

CLIENT: **Central Louisiana Economic Development Alliance**
PROJECT: **Louisiana Economic Development Certified Sites Program**
LOCATION: **Port of Avoyelles, Avoyelles Parish, Louisiana**
FILE No.: **06-13-145**
DATE DRILLED: **7/3/13**
DRILLING METHOD(S): **Diedrich D-50, Rotary Wash**

LOGGED BY: **T. Robin** CHECKED BY: **H. Carroll**

GROUNDWATER INFORMATION:
Water Seepage Noted @ 18.0 Feet While Drilling
Water Level @ 22.0 Feet After 1 Hour
Boring Walls Collapsed @ 30.0 Feet

SURFACE ELEVATION: **Not Determined**

DEPTH (FT)	N: BLOWS/FT P: TONS/SQ FT	MOISTURE CONTENT (%)	LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	MINUS NO. 200 SIEVE (%)	DRY DENSITY (Lbs./Cu.Ft.)	COMPRESSIVE STRENGTH (Lb./Sq. Ft.)	DESCRIPTION OF STRATUM
	N = 13	19	57	25	32	98			Stiff Brown FAT CLAY (CH)
	P = 3.50	19					105	7132	- very stiff @ 2.5'
5	P = 1.25	29					92	2084	- stiff, red @ 4.5'
	P = 2.00	31	76	28	48	99	89	2177	
	P = 0.75	38					81	1065	- firm, reddish yellow & gray @ 9.0'
10									
	P = 1.25	36	98	31	67	99	85	556	- soft below 14.0'
15									
	P = 1.00	35					84	695	
20									22.0'
									Loose Brown & Gray Sandy SILT s(ML)
25	N = 5	34	NP	NP	NP	55			
30	N = 13	30							- medium dense @ 29.0'
35	N = 3	37							- loose @ 34.0'
40	N = 14	29				59			- medium dense, gray below 39.0'
45	N = 14	31							47.00
									Stiff Gray FAT CLAY (CH)
50	N = 13	46	63						50.0'
									Boring Terminated @ 50.0 Feet

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE

NOTES:
SeeSee Plan of Borings for Location
Stratification and Groundwater Depths Are Not Exact

LOG OF BORING B-4

Geotechnical Testing Laboratory, Inc.
226 Parkwood Drive
Alexandria, LA 71301
Telephone: (318) 443-7429

CLIENT: **Central Louisiana Economic Development Alliance**
PROJECT: **Louisiana Economic Development Certified Sites Program**
LOCATION: **Port of Avoyelles, Avoyelles Parish, Louisiana**
FILE No.: **06-13-145**
DATE DRILLED: **7/3/13**
DRILLING METHOD(S): **Diedrich D-50, Rotary Wash**

LOGGED BY: **T. Robin** CHECKED BY: **H. Carroll**

GROUNDWATER INFORMATION:
Water Seepage Noted @ 21.0 Feet While Drilling
Water Level @ 28.0 Feet After 1 Hour
Boring Walls Collapsed @ 50.0 Feet

SURFACE ELEVATION: **Not Determined**

DEPTH (FT)	N: BLOWS/FT P: TONS/SQ FT	MOISTURE CONTENT (%)	LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	MINUS NO. 200 SIEVE (%)	DRY DENSITY (Lbs./Cu.Ft.)	COMPRESSIVE STRENGTH (Lb./Sq. Ft.)	DESCRIPTION OF STRATUM
	P = 3.50	23					101	4863	Very Stiff Brown FAT CLAY (CH)
	P = 1.75	30	72	28	44		91	2501	- stiff @ 3.0'
5	P = 2.00	33					87	1667	- firm, red @ 6.0'
10	P = 1.50	37	92	30	62		83	1343	- firm, reddish yellow & gray @ 9.0'
15	P = 2.25	23					93	1065	
20	P = 1.75	34	82	28	54		86	1297	22.0'
25	P = 1.50	29							Loose Gray Sandy SILT s(ML)
30	N = 11	33	NP	NP	NP	61			- medium dense @ 29.0'
35	N = 13	23							
40	N = 6	36							- loose @ 39.0'
45	N = 12	33	NP	NP	NP	62			- medium dense @ 44.0'
50	N = 5	32							- loose @ 49.0' 53.5'
55	N = 12	29							Medium Dense Gray Silty SAND to Sandy SILT (SM-ML)s
60	N = 14	30				49			

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE

NOTES:
SeeSee Plan of Borings for Location
Stratification and Groundwater Depths Are Not Exact

LOG OF BORING B-4

Geotechnical Testing Laboratory, Inc.
226 Parkwood Drive
Alexandria, LA 71301
Telephone: (318) 443-7429

CLIENT: **Central Louisiana Economic Development Alliance**
PROJECT: **Louisiana Economic Development Certified Sites Program**
LOCATION: **Port of Avoyelles, Avoyelles Parish, Louisiana**
FILE No.: **06-13-145**
DATE DRILLED: **7/3/13**
DRILLING METHOD(S): **Diedrich D-50, Rotary Wash**
LOGGED BY: **T. Robin** CHECKED BY: **H. Carroll**

GROUNDWATER INFORMATION:
Water Seepage Noted @ 21.0 Feet While Drilling
Water Level @ 28.0 Feet After 1 Hour
Boring Walls Collapsed @ 50.0 Feet

Not Determined

DEPTH (FT)	N: BLOWS/FT P: TONS/SQ FT	MOISTURE CONTENT (%)	LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	MINUS NO. 200 SIEVE (%)	DRY DENSITY (Lbs./Cu.Ft.)	COMPRESSIVE STRENGTH (Lb./Sq. Ft.)	DESCRIPTION OF STRATUM
									Medium Dense Gray Silty SAND to Sandy SILT (SM-ML)s *(continued)* 62.0'
									Medium Dense Gray Silty SAND (SM)
65	N = 19	27							
70	N = 7	33							- loose @ 69.0'
75	N = 9	30	NP	NP	NP	40			
80	N = 12	28							- medium dense @ 79.0'
85	N = 20	35							
90	N = 33	24	NP			17			- dense @ 89.0'
95	N = 37	23							
100	N = 38	24							100.0'
									Boring Terminated @ 100.0 Feet

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE

NOTES:
SeeSee Plan of Borings for Location
Stratification and Groundwater Depths Are Not Exact

LOG OF BORING B-5

Geotechnical Testing Laboratory, Inc.
226 Parkwood Drive
Alexandria, LA 71301
Telephone: (318) 443-7429

CLIENT: **Central Louisiana Economic Development Alliance**
PROJECT: **Louisiana Economic Development Certified Sites Program**
LOCATION: **Port of Avoyelles, Avoyelles Parish, Louisiana**
FILE No.: **06-13-145**
DATE DRILLED: **7/3/13**
DRILLING METHOD(S): **Diedrich D-50, Rotary Wash**
LOGGED BY: **T. Robin** CHECKED BY: **H. Carroll**

GROUNDWATER INFORMATION:
Water Seepage Noted @ 30.0 Feet While Drilling
Water Level @ 25.0 Feet After 1 Hour
Boring Walls Remained Uncaved

SURFACE ELEVATION: **Not Determined**

FIELD DATA: DEPTH (FT)	N: BLOWS/FT P: TONS/SQ FT	MOISTURE CONTENT (%)	LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)	MINUS NO. 200 SIEVE (%)	DRY DENSITY (Lbs./Cu.Ft.)	COMPRESSIVE STRENGTH (Lb./Sq. Ft.)	DESCRIPTION OF STRATUM
0–2.0'	N = 22	6	NP	NP	NP	51			Medium Dense Brown Silty SAND to Sandy SILT (SM-ML)s — 2.0'
2.0–5.0'	P = 0.75	30						**	Firm Red LEAN CLAY (CL) w/silt — 5.0'
5.0–12.0'	P = 3.00	23	54	23	31	97	100	3149	Stiff Red LEAN to FAT CLAY
	P = 3.00	32					90	1991	- firm @ 8.0' — 12.0'
12.0–31.5'	P = 1.75	35	58	29	29	99	85	463	Soft Reddish Yellow & Gray FAT CLAY (CH)
	P = 2.50	38					83	1713	- firm @ 19.0'
	P = 1.50 ▼	39	83	29	54	99	79	1343	
	P = 1.75 ▽	32					87	324	- very soft @ 29.0' — 31.5'
31.5–38.5'	N = 14	33	NP	NP	NP	64			Medium Dense Gray Sandy SILT s(ML) — 38.5'
38.5–47.0'	N = 6	37							Firm Gray FAT CLAY (CH)
	N = 13	45	64	26	38	97			- stiff @ 44.0' — 47.0'
47.0–50.0'	N = 36	31							Dense Gray Silty SAND (SM) — 50.0'

Boring Terminated @ 50.0 Feet

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE

NOTES:
SeeSee Plan of Borings for Location
Stratification and Groundwater Depths Are Not Exact

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

Laboratory Analysis of Soils For Soil-Cement Treatment

Report Date: 7/9/2013 **Sample Date**: 6/22/2013 **Project No:** 06-13-145

Prepared For: Central Louisiana Economic Development Aliance
P.O. Box 465
Alexandria, LA 71309

Attention: Mr. James H. Clinton
President and C.E.O.

Project: LA Economic Development Certified Sites Program, Port of Avoyelles, Avoyelles Parish, LA

Test Methods: DOTD TR407, TR413, TR423, TR428

Laboratory Results:

Test	Site Subgrade	Cement Treatment Specifications
Silt, %	66	65% Max.
Sand, %	3	79% Max.
Clay, %	31	
Liquid Limit (LL)	31	
Plasticity Index (PI)	10	22 Max.
Organic Content, %	1.3	2.0 Max.
Soil Group	A-6	
Soil Classification	Lean Clay w/silt	
Results	**Unusable**	

Geotechnical Testing Laboratory, Inc.

Using pH to Estimate the Soil-Lime Proportion Requirement for Soil Stabilization

Report Date: 7/9/2013 **Sample Date**: 6/22/2013 **Project No:** 06-13-145

Prepared For: Central Louisiana Economic Development Aliance
P.O. Box 465
Alexandria, LA 71309

Attention: Mr. James H. Clinton
President and C.E.O.

Project: LA Economic Development Certified Sites Program, Port of Avoyelles, Avoyelles Parish, LA

Test Method: ASTM D4318; D6276-99a

Scope: This test method provides a means for estimating the soil-lime proportion requirements for stabilization of a soil. The optimum soil-lime proportion is selected by determining the lowest percentage of lime that results in a soil-lime pH of 12.4 for at least two successive test samples at increasing lime percentages.

Laboratory Results:

Material Origin	Jobsite Subgrade				
Material Description	Lean to Fat CLAY (CL-CH) (A-7-6)				
Average Liquid Limit (LL)	57				
Average Plasticity Index (PI)	32				
Quantity	**1.0%**	**2.0%**	**3.0%**	**4.0%**	**5.0%**
pH Results	11.74	12.17	12.42	12.46	12.59

Recommended, % by weight: 4.0

Spread Rate: 2.76 pounds per square yard per inch of compacted thickness

Comments: The spread rate is based off of an average dry unit soil weight of 92 pounds per cubic foot.

Geotechnical Testing Laboratory, Inc.